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EFFECT OF SQUIRRELS ON THE SUPPLY OF PONDEROSA PINE SEED

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The intense activity of squirrels in ponderosa pine (Pinus ponderosa Laws.) during a good seed year has been noted many times by foresters. However, the amount of seed lost because of such activity and the possible effects upon natural regeneration of the species in western Montana have been largely matters of speculation. This report shows that squirrels do cut a great many cones and may be even more of a factor than mice[2/ 3/] in reducing the quantity of seeds available for germination. It also points out the need for some practical method of control.

In July 1952, eight ponderosa pine trees in a partially cut stand in Bluesky Creek drainage, Kootenai National Forest, were chosen for study. The trees were climbed and from 10 to 15 branches in the upper crown of each were selected systematically. Each cone-bearing shoot on these branches was tagged and an estimate of damage to the 1951 cone crop was made. The trees are being reexamined periodically for production and loss of cones and dispersal of seed.

Estimates of squirrel damage were also made in Butler Creek and Dunn Creek drainages on the Kootenai National Forest. Four trees in an experimental plot at Butler Creek were examined in 1951; four trees in a plot at Dunn Creek were examined in 1951 and 1953.

1/ The author wishes to acknowledge the cooperation of the J. Neils Lumber Co. of Libby, Montana, which provided material and labor for banding of trees and assisted otherwise in this study.

2/ Squillace, A. E., and Adams, Lowell. Dispersal and survival of seed in a partially cut ponderosa pine stand. Northern Rocky Mountain Forest and Range Experiment Station, Research Note No. 79. March 1950.

3/ Adams, Lowell. Consumption of ponderosa pine seed by small mammals. Northern Rocky Mountain Forest and Range Experiment Station, Research Note No. 80. March 1950.

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RESULTS

Squirrels cut most of the cones which matured during the three years (table 1). For example, at Bluesky Creek they removed 85 percent of the crop maturing in 1953. The proportions cut varied little from area to area or from year to year. The 1951 and 1953 crops were considered fair, while the 1952 crop was definitely poor. Just what proportion of cones squirrels would cut in a good seed year, such as in 1948, remains to be seen. It is quite obvious, however, that squirrels harvest most of the seed crop in poor and fair years.

Table 1. Proportion of mature cones cut by squirrels, 1951 to 1953, on three areas within the Kootenai National Forest

Area	1951 Crop			1952 Crop			1953 Crop		
		Basis			Basis			Basis	
	Cones cut	Trees	Total Cones	Cones cut	Trees	Total Cones	Cones cut	Trees	Total Cones
	Percent	Number	Number	Percent	Number	Number	Percent	Number	Number
Bluesky Creek	77	8	144	89	8	9	85	8	80
Butler Creek	76	4	112	1/	1/	1/	1/	1/	1/
Dunn Creek	74	4	98	1/	1/	1/	60	4	147

1/ No samples taken.

In addition to the effect upon the current crop, damage is often done to the following crop and perhaps to other subsequent crops as well. In most instances the squirrels cut the cone-bearing shoots just below the current mature cones rather than severing only cone stalks. When these shoots also bear one-year-old conelets, the crop for the following season is reduced accordingly. For example, at Bluesky Creek, 9 percent of all conelets which would presumably mature in 1954 were lost incidental to the cutting of mature cones in 1953. Furthermore, cutting the cone-bearing shoots no doubt reduces the flowering potential for at least the next few seasons.

The squirrels began cutting cones as early as July. At Bluesky Creek approximately 15 percent of the mature or nearly mature cones were removed prior to August 3, 1953. It appeared that cones were cut in July and early August mainly for immediate use, while the principal storage of cones occurred just prior to maximum dispersal in September.

DISCUSSION

Rodent damage to seed crops during fair and poor seed years seriously hampers natural regeneration of partially cut stands. Attempts to restock a number of such ponderosa pine stands during the recent poor and fair seed years have failed, mainly because insufficient seed became available for germination. In view of this apparent inefficacy of fair

and poor seed crops one might consider depending upon good seed years to obtain adequate regeneration. Whether or not the effects of squirrels and mice are serious as well during good seed years is uncertain. Aside from this consideration, several disadvantages are apparent in attempting to gear practical operations to good seed years:

1. Good seed crops are believed to occur at intervals of 2 to 5 years and possibly longer. (The last good crop on the Kootenai National Forest occurred in 1948.)

2. The effectiveness of seedbed preparation decreases with time. Adequate seed dispersal is considered necessary within 3 to 4 years after seedbed preparation. Since cone crop predictions at present are practical for only one year in advance, forest managers waiting for good seed crops would have to concentrate seedbed preparation immediately prior to and during the good seed years. Such irregular scheduling of work would be difficult and impractical.

3. Good seed years may coincide with seasons of unfavorable weather, and under such conditions ample seed supply alone does not insure successful regeneration.

4. Waiting for good seed years may leave forest land idle for as long as 5 years after logging, and also increase the possibility of brush invasion.

The above difficulties point up the need for taking advantage of fair and poor seed crops. In order to secure a reasonable measure of success from them, rodent control must be considered.

Although it appears that squirrels may destroy more of the total seed crop than mice, control of both may be necessary. Undoubtedly, control of squirrels would increase seed fall greatly, but increased dispersal may result only in greater quantities being taken by mice. It is believed that mouse populations fluctuate with quantity of seed disseminated. Until these interactions are better understood, control of both squirrels and mice should be considered.

Whereas control measures for mice are now being tested widely, practical methods for controlling squirrels are not available. One technique worthy of further investigation is to band or otherwise protect selected seed trees. A preliminary small-scale trial of banding was made at Dunn Creek in the fall of 1953. A 20-inch-wide sheet of aluminum nailed in a continuous band around the trunks of isolated trees at 5 to 7 feet from the ground, effectively kept squirrels from climbing.

The control of damage on individual trees instead of attempts at reducing squirrel populations, may prove useful in efforts to improve the genetic quality of future stands. Through banding superior trees, seed production can be concentrated in heavy cone producers with good growth and form characteristics. By the same token, squirrel activity will be restricted to inferior trees.

Although banding as presently applied may be satisfactory for experimental purposes, the method needs further investigation before it can be considered for practical application. Some factors needing study are:

1. Possibilities for reducing the cost of bands by using different designs or cheaper materials.

2. The extent to which isolation of protected trees is necessary.

3. The number of seed trees per acre needed for adequate seed supply.

SUMMARY

A preliminary study of squirrel damage to ponderosa pine seed crops on the Kootenai National Forest in western Montana shows that squirrels cut from 60 to 89 percent of the cones in poor and fair seed years. Such damage is considered sufficient to warrant control in order to improve chances for natural regeneration. Nailing a 20-inch band of aluminum around the trunk of isolated trees at about 5 to 7 feet above the ground proved effective in keeping out squirrels. This method, incompletely examined in this study, needs further investigation before it can be considered a practical control method. Control of damage on individual trees could be used as a means of favoring seed production by superior individuals, and so lead to improved future stands.